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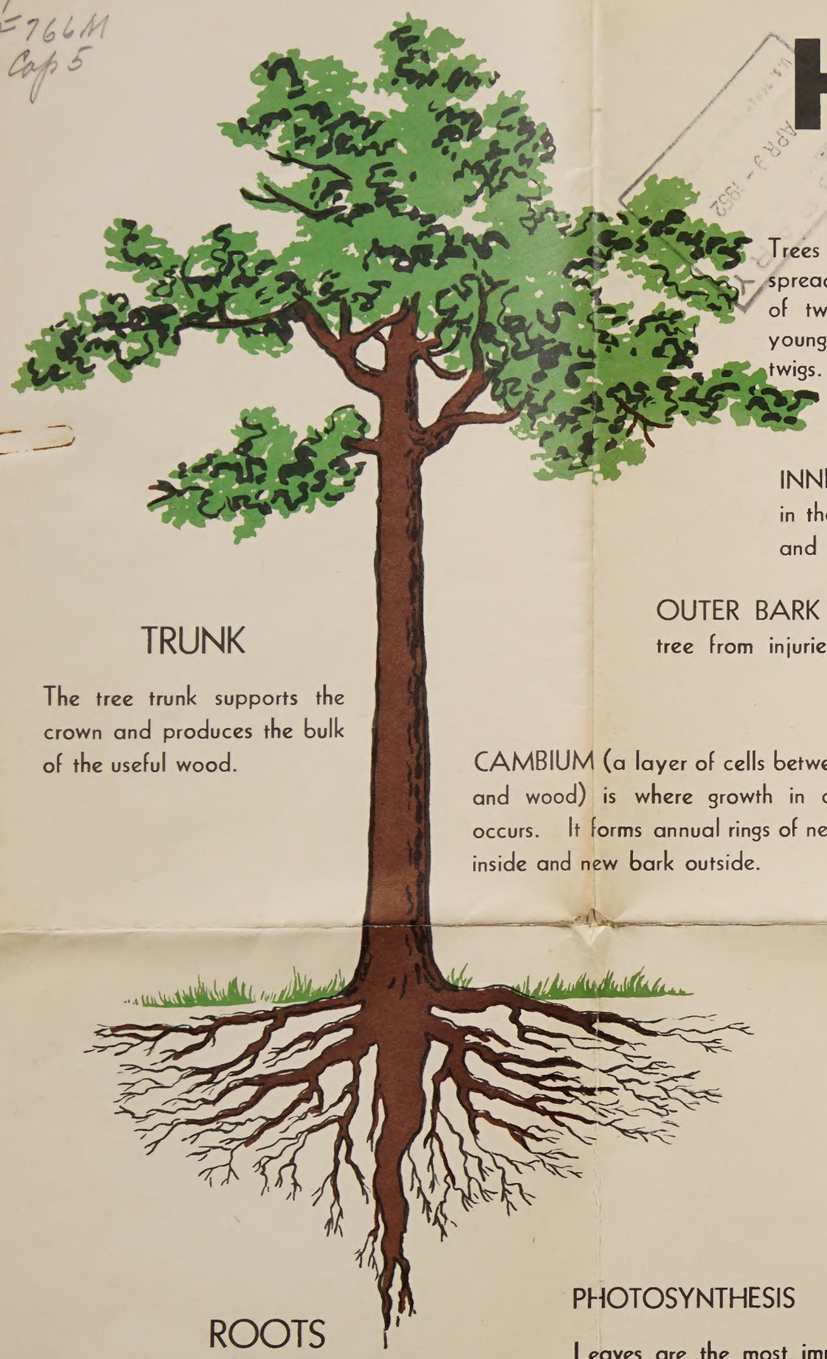
HOW A TREE GROWS



TRUNK

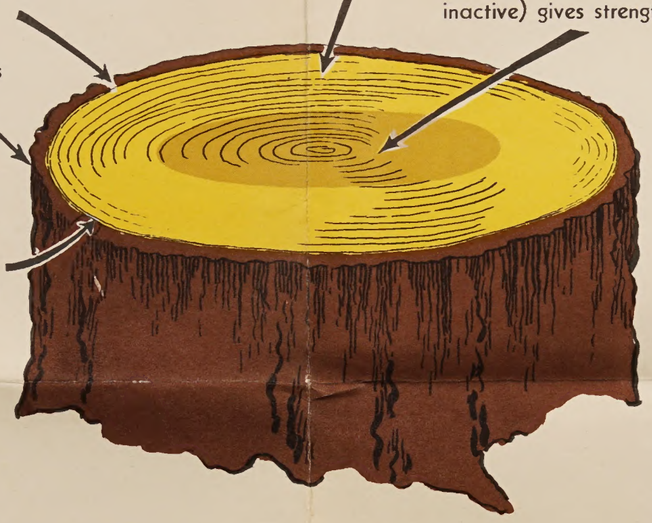
The tree trunk supports the crown and produces the bulk of the useful wood.

ROOTS

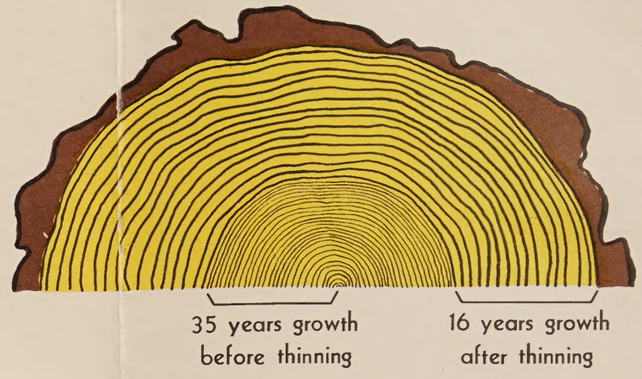
Roots anchor the tree; absorb water, dissolved minerals and nitrogen necessary for the living cells which make the food; and help hold the soil against erosion. A layer of growth cells at the root tips makes new root tissue throughout the growing season.

CROWN

Trees increase each year in height and spread of branches by adding a new growth of twigs. This new growth comes from young cells in the buds at the ends of the twigs.


SAPWOOD (Xylem) carries sap from roots to leaves.
INNER BARK (Phloem) carries food made in the leaves down to the branches, trunk, and roots.
HEARTWOOD (was sapwood, now inactive) gives strength.
OUTER BARK protects tree from injuries.
CAMBIUM (a layer of cells between bark and wood) is where growth in diameter occurs. It forms annual rings of new wood inside and new bark outside.

THINNING INCREASES GROWTH



FIRE RUINS TIMBER

Disease and insects enter through fire scars

PHOTOSYNTHESIS

Leaves are the most important chemical factories in the world. Without their basic product, sugar, there would be no food for man or animal, no wood for shelter, no humus for the soil, no coal for fuel.

Inside each leaf, millions of green-colored, microscopic "synthetic chemists" (chloroplasts) manufacture sugar. They trap radiant energy from sunlight for power. Their raw materials are carbon dioxide from the air and water from the soil. Oxygen, a byproduct, is released. This fundamental energy-storing, sugar-making process is called photosynthesis.

What happens to this leaf-made sugar in a tree? With the aid of "chemical specialists" (enzymes), every living cell—from root tips to crown top—goes to work on the sugar. New products result. Each enzyme does a certain job, working with split-second timing and in harmony with the others. In general, they break down sugar and recombine it with nitrogen and minerals to form other substances.

ENZYMES

—Change some sugar to other foods such as starches, fats, oils, and proteins, which help form fruits, nuts, and seeds.

—Convert some sugar to cell-wall substances such as cellulose, wood, and bark.

—Make some of the sugar into other substances which find special uses in industry. Some of these are rosin and turpentine from southern pines; syrup from maples; chewing gum from chicle trees and spruces; tannin from hemlocks, oaks, and chestnuts.

—Use some of the sugar directly for energy in the growing parts of the tree—its buds, cambium layer, and root tips.

TRANSPIRATION

Transpiration is the release of water-vapor from living plants. Most of it occurs through the pores (stomates) on the underside of the leaves. Air also passes in and out.

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